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(54) Kit for producing a connector for fluid-conducting elements

(57) A kit for producing a connector (24) for fluid pipe elements comprises loose sleeve couplings (1, 2) and at least one flat blank (3, 4) which has been given such a shape and such dimensions that, after forming thereof and interconnecting its opposite ends, it is connectable with the sleeve couplings (1, 2) by means of a peripheral joint, thereby forming an intermediate segment (3', 4'). The sleeve couplings (1, 2) are provided with external peripheral sealing elements (5, 6).

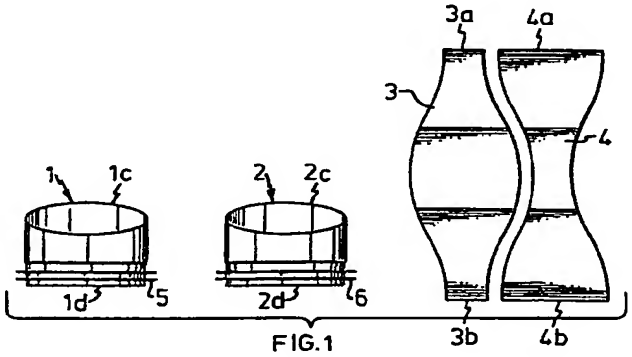
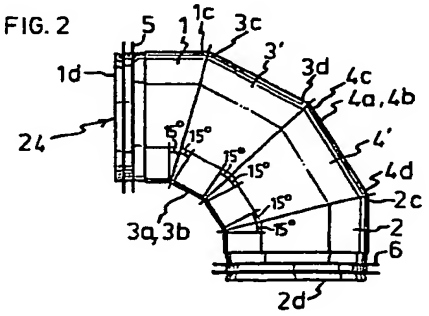


FIG.1

FIG. 2



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Description

Field of the Invention

This invention relates to a kit, a sleeve coupling and a method for producing a connector or end piece for connecting fluid-conducting elements, inter alia for ventilation systems, in accordance with the preamble of appended claims 1, 14 and 16, respectively.

Background of the Invention

Conventional ventilation duct systems are composed of elongate straight parts and a large number of different connectors and end pieces, such as pipe bends, T-pieces, end outlets etc., which allow the ducts to be laid in forms deviating from the straight form.

To make it possible to mount a ventilation duct system to suit its purpose, a great variety of connectors must be available. For example, pipe bends must be manufactured to have different angles, e.g. up to 90° in steps of 15°, which means that a very great number of variants must be manufactured in advance and stored, thus implying heavy capital expenditure for stock-keeping.

Moreover, the finished connectors are relatively bulky to store and transport, which also results in high costs.

An object of the invention is to provide a solution to these problems.

Summary of the Invention

This object is achieved by means of a kit, a sleeve coupling and a method which are of the type mentioned by way of introduction and which, according to the invention, have the characterising features defined in appended claims 1, 14 and 16, respectively. Preferred embodiments of the invention are recited in the subclaims.

According to one aspect of the invention, the kit comprises loose sleeve couplings and at least one flat blank which has been given such a shape and such dimensions that, after forming thereof and interconnecting its two opposite ends, it is connectable with said sleeve couplings by means of a peripheral joint, thereby forming an intermediate segment.

The present invention brings the advantage that the number of standard products in stock is reduced since a limited amount of variants of sleeve couplings and intermediate segments can be combined to form many different connectors and end pieces.

The sleeve couplings and flat elements included in the kit are made of metal sheet, preferably pregalvanised metal sheet when ventilation systems are involved. The flat elements are formed by bending or rolling, and their opposite ends are interconnected, preferably by welding. The formed elements are connected with the sleeve couplings and with each other preferably by means of folded seams. Their number is at least one and sufficiently many to form, together with the sleeve couplings, the connector, with no further deforming working thereof than the above-mentioned forming, preferably bending/rolling. A 90° pipe bend thus requires at least two sheet-metal elements. The cutting-out of flat sheet-metal elements from metal sheeting is advantageously carried out in such a manner that the cut-out sheet-metal elements supplement each other, which of course results in optimal utilisation of the metal sheeting.

Some embodiments of the invention will now be described in more detail, reference being made to the accompanying schematic drawings.

Brief Description of the Drawings

Fig. 1 is a side view of two sleeve couplings and a top plan view of two flat elements;
Fig. 2 is a side view of an assembled pipe bend with a 90° change of angle;
Fig. 3 is a side view of two sleeve couplings and a top plan view of a flat element;
Fig. 4 is a side view of an assembled pipe bend with a 60° change of angle;
Fig. 5 is a side view of two sleeve couplings and a top plan view of a flat element;
Fig. 6 is a side view of an assembled pipe bend with a 45° change of angle;
Fig. 7 is a side view of two sleeve couplings and a top plan view of four flat elements;
Fig. 8 is a side view of an assembled pipe bend, corresponding to the one shown in Fig. 2;
Fig. 9 is a side view of two sleeve couplings of different sizes and a top plan view of a flat element;
Fig. 10 is a side view of an assembled so-called reducer;
Figs 11 and 12 illustrate a T-connector and a kit for producing the same;
Figs 13-16 illustrate the connection between a sleeve coupling and an intermediate segment by means of a folded seam;
Fig. 17 is a side view of an assembled pipe bend with a 90° change of angle; and
Fig. 18 is a perspective view of a connection device.

Description of Preferred Embodiments

Fig. 1 illustrates the components of a kit adapted to form a non-straight connector, in this case in the form of a pipe bend 24 for conducting a fluid, which is shown in Fig. 2. The separate components are two identical, substantially circular sheet-metal end sleeve couplings 1, 2 for connecting the pipe bend 24 with further fluid-conducting elements (not shown), and two flat blanks or sheet-metal elements 3, 4 supplementing one another. Each sleeve coupling 1, 2 has a first end 1c, 2c to be

joined to corresponding ends or edges 3c, 4d of the blanks 3', 4' as bended, and a second end 1d, 2d for connection with said fluid-conducting elements. Each sleeve coupling end 1c, 1d, 2c, 2d has a smooth cylindrical shape and defines an opening in the associated sleeve coupling 1, 2.

After the operations described in the Summary of the Invention, i.e., bending or rolling the blanks, and inter-connecting the ends thereof, the blanks or sheet-metal elements are connectable with each other (at 3d, 4c) and with the circular sleeve couplings 1, 2 (at 1c, 3c and 2c, 4d, respectively) in the manner shown for delimiting a duct and, thus, for forming the pipe bend 24. Opposite ends 3a, 3b and 4a, 4b of the blanks 3, 4 are preferably welded together. The weld joints 3a, 3b and 4a, 4b are shown in Fig. 2. The pipe bend 24 has a change of angle from one sleeve coupling to the other, i.e. it forms an angle of 90°. All so-called segment angles are 15°. After forming and being connected by a folded seam, the two originally flat blanks 3, 4 form intermediate segments 3', 4' of the pipe bend 24. These cylindrical segments 3', 4' each have a central axis in the pipe bend 24. The sleeve couplings 1, 2 have central axes as well which in this pipe bend 24 form a predetermined angle of 90°.

The sleeve couplings 1, 2 are each fitted with an external peripheral, elastic sealing ring 5, 6 which preferably is substantially U-shaped in cross-section, a so-called double lip seal, the web of which is fixed to the outside of the sleeve couplings 1, 2. The sealing rings 5, 6 establish a seal between the sleeve couplings 1, 2 and the above-mentioned further fluid-conducting elements. This type of seal and tubular connections generally are disclosed in Us Patent 4,050,703 to Tuvesson et al.

Fig. 3 illustrates the same end sleeve couplings 1, 2 and the same, originally flat blank 3, the components 1, 2, 3 producing the 60° pipe bend 7 illustrated in Fig. 4. It should be noted that also the flat blank 4 in Fig. 1 can be used to produce the 60° pipe bend in Fig. 4. The weld joint is then diametrically opposed to the joint shown in Fig. 4 (cf. Fig. 2).

Fig. 5 illustrates end sleeve couplings 8, 9 which are of a slightly smaller height than the sleeve couplings 1, 2 and which are connectable with an originally flat (at 10) intermediate segment 10' for forming a 45° pipe bend 11 as shown in Fig. 6. The pipe bend 11 has 11.25° segment angles. Thus, the dimensions of the blank 10 are different from those of the blank 3 in Figs 1 and 3.

Fig. 7 shows an alternative embodiment of the kit in Fig. 1 for producing a 90° pipe bend 16 as shown in Fig. 8. The components of the kit comprise two differently shaped end sleeve couplings 12, 13 and four flat blanks or sheet-metal elements 14, 3, 4, 15 which are connectable with each other to form intermediate segments 14', 3', 4', 15', and with the sleeve couplings 12, 13 to form the pipe bend 16. In this case, the sleeve couplings 12, 13 are not bevelled. To facilitate the connection with the sleeve couplings 12, 13, they are here provided with a collar 23. The blanks 3, 4 and the intermediate segments 3', 4' are identical with the blanks and the intermediate segments illustrated in Figs 1 and 2.

Fig. 9 illustrates a kit for producing a connector 30 of decreasing cross-section, a so-called reducer that is illustrated in Fig. 10. To this end, the sleeve couplings 26, 27 are of different diameters, and the curvature of the flat element 28 (shown on a smaller scale) is adapted thereto.

Figs 11 and 12 illustrate a T-connector 32, having two end sleeve couplings 35 secured to an intermediate segment 37' using a folding machine or other connection method known in the art. As in the other embodiments, the intermediate segment 37' is formed by shaping a blank 37, so that a third opening is provided for mating with the third or central sleeve coupling 33.

Figs 13-16 show the folding operation which can be used to connect two separate components in the kit with each other. Fig. 13 illustrates the sleeve coupling 12 and the intermediate segment 14' formed to a circle, before being connected with one another. The edge portion of the intermediate segment 14' is bent outward by a folding machine (not shown) from the circumferential surface 25 of the pipe bend, essentially at right angles thereto, thereby forming a flange 22. The metal is not split during bending or folding because the deformation does not exceed the breaking strength of the material. The end of the sleeve coupling 12 facing away from the end supporting the seal 5 is now collared with the folding machine, but by means of other rollers which are arranged in a manner for forming the collar, if this has not been done before, cf. Fig. 7, for a folded seam connection with the intermediate segment 14'. The flange 22 is caused to engage that part of the collar 23 which extends substantially in parallel with the flange 22, cf. Fig. 14, by axial displacement of the segment 14' or the sleeve coupling 12. Subsequently, that part of the collar 23 which extends substantially at right angles to the flange 22 and around the same is bent in a folding machine using rollers and clamped against the flange 22 to form a reliable and tight peripheral joint. It will be appreciated that the folded seam connection may be "reversed", i.e. the collar is formed on the intermediate segment, while the sleeve coupling is formed with a radially projecting flange.

Fig. 17 shows a pipe bend 17 which is composed of the end sleeve coupling 12, the four intermediate segments 14', 3', 4', 15', and a sleeve coupling 18 whose one end is provided with a peripheral end bead 19 for engaging a detachable, external connecting device 20 which is illustrated in Fig. 18 and which is adapted to connect the sleeve coupling 18 with a further fluid-conducting element formed with a similar end bead. The connection device 20 is further fitted with a peripheral internal seal 21.

The principles of the method of the invention are easily understood by the description above. The main

steps are: determining a connection angle for the connector, shaping at least one flat blank to form a cylindrical element and joining the sleeve couplings to this element in the manner further specified in appended claim 16.

General Advantages and Alternative Embodiments

According to the invention, a number of advantages are obtained, some of which have been discussed in the introductory part of the specification. If the kit is used to produce connectors for ventilation duct systems, particular advantages are obtained. Conventional connectors of this type can be hot-dip galvanised, which means that the peripheral groove in which the seal is to be arranged, must be formed before the hot-dip galvanising, since the zinc layer would otherwise crack and scale off in the area that is worked. Such hot-dip galvanising also results in the zinc layer partly filling the groove formed, thus reducing the space intended for the seal, which in turn causes problems when assembling the connector and a further pipe element. By means of the kit according to the invention, these drawbacks are obviated, since the sleeve couplings can be manufactured of metal sheeting which is pregalvanised in a manner that allows working in the form of e.g. roll-forming of the groove.

A further problem in conventional manufacture of connectors for ventilation duct systems is that in some cases the connector must be subjected to relative extensive working during the manufacture, in which the material hardens, implying that it will be difficult to form the groove in which the seal is to be arranged. During the forming, some portions of the groove frequently grow in an uncontrollable manner. Moreover, there is a risk that the material cracks in the transition zone between the groove and an adjoining straight part of the connector. Also this inconvenience will be obviated by means of the kit according to the invention, since the sleeve couplings included therein can be manufactured separately from a material which is easy to work and which requires neither e.g. pressure turning nor pressing, prior to the forming of the groove.

The concept of the invention provides high flexibility since the sleeve couplings and blanks can be manufactured separately and, if suitable, in different factories. The blanks can be stored and transported in their flat stat and then require but a small space, thus reducing the costs. The invention also creates the possibility of producing the finished products (pipe bends, T-pieces etc.) in connection with the site where the ventilation system is to be installed.

Finally, it should be emphasised that the invention is in no way restricted to the embodiments described above, but several modifications are feasible within the scope of the inventive idea defined in the accompanying claims. It should be particularly emphasised that the inventive concept is applicable to many different types of connectors and similar components.

Claims

1. Kit for producing a connector for connecting a first fluid-conducting element to a second fluid-conducting element and permitting passage of a fluid from said first fluid-conducting element to said second fluid-conducting element, comprising:

   a first cylindrical sleeve coupling (1) having a first sleeve coupling end (1c) and a second sleeve coupling end (1d), each said sleeve coupling end (1c, 1d) defining an opening in said first cylindrical sleeve coupling (1), said first sleeve coupling end (1c) having a smooth cylindrical shape, and said second sleeve coupling end (1d) matable with said first fluid-conducting element; and

   a second cylindrical sleeve coupling (2) having a first sleeve coupling end (2c) and a second sleeve coupling end (2d), each said sleeve coupling end (2c, 2d) defining an opening in said second cylindrical sleeve coupling (2), said first sleeve coupling end (2c) having a smooth cylindrical shape, and said second sleeve coupling end (2d) matable with said second fluid-conducting element;

   characterised by at least one flat blank (3) having a first end (3a) connectable to a second end (3b) to form a cylindrical segment (3'), a first segment end (3c), and a second segment end (3d), each said segment end (3c, 3d) having a smooth cylindrical shape and defining an opening in said cylindrical segment (3');

   said smooth cylindrical shape of said first sleeve coupling ends (1c, 2c) of each said first and said second sleeve coupling (1, 2) being adapted to accommodate juncture with said first segment end (3c) and said second segment end (3d), respectively; and

   said second sleeve coupling end (1d, 2d) of each said first and said second cylindrical sleeve coupling (1, 2) further including an external peripheral seal (5, 6) or an end bead 19) for engaging an external connecting device (20).

2. A kit according to claim 1, wherein the connector is angled for connecting said first fluid-conducting element to said second fluid-conducting element at a predetermined angle.

3. A kit according to claim 1 or 2, wherein said cylindrical segment comprises a plurality of flat blanks (3, 4, 14, 15), each said flat blank formable into an intermediate cylindrical segment having a smooth cylindrical shape to accommodate juncture with an

adjacent intermediate cylindrical segment.

4. A kit according to any one of claims 1-3, wherein said external peripheral seal includes an elastomeric sealing element (5, 6).

5. A kit according to claim 4, wherein said sealing element (5, 6) is U-shaped and projects radially from said second sleeve coupling end.

6. A kit according to any one of claims 1-5, wherein at least one of said first and said second segment end further comprises a radially projecting flange (22).

7. A kit according to claim 6, wherein at least one said first sleeve coupling end (23) of said first and second cylindrical sleeve coupling (12; 13) is adapted to be edge formed with said radially projecting flange (22).

8. A kit according to claim 7, wherein said at least one said first sleeve coupling end (23) of said first and second cylindrical sleeve coupling (12; 13) is crimped over said radially projecting flange (22).

9. A kit according to any one of claims 1-5, wherein said at least one said first sleeve coupling end (1c, 2c) of said first and second cylindrical sleeve coupling (1, 2) is adapted to be bonded to one of said first and second segment end (3c, 3d).

10. A kit according to claim 9, wherein said bonding includes folding or welding.

11. A kit according to any one of claims 1-10, wherein said fluid-conducting elements are pipes, preferably ventilation ducts.

12. A kit according to any one of claims 1-11, wherein said at least one flat blank (3) is made of sheet metal.

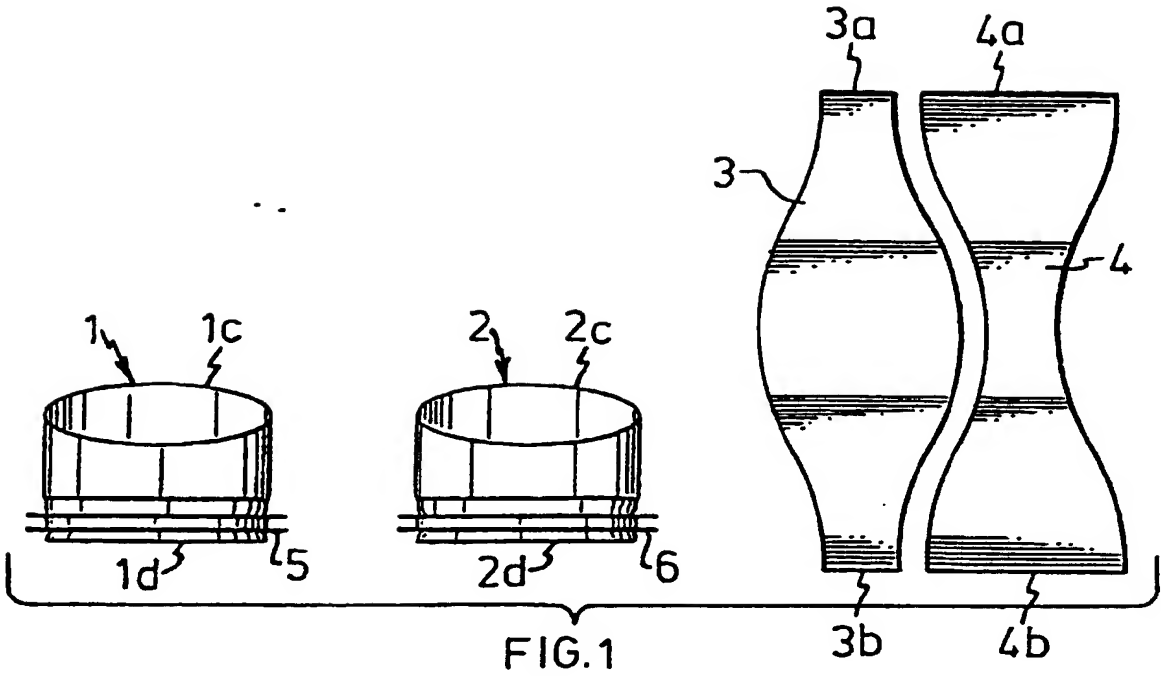
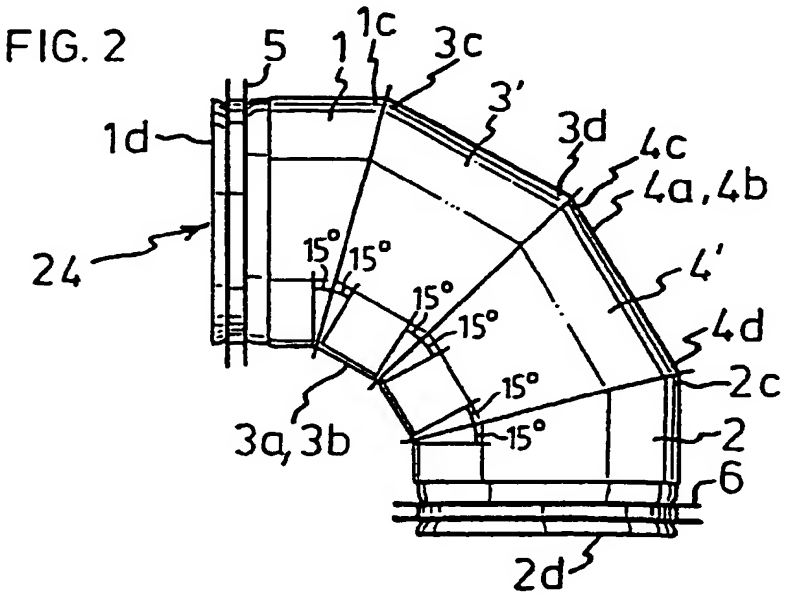


FIG.1

FIG. 2



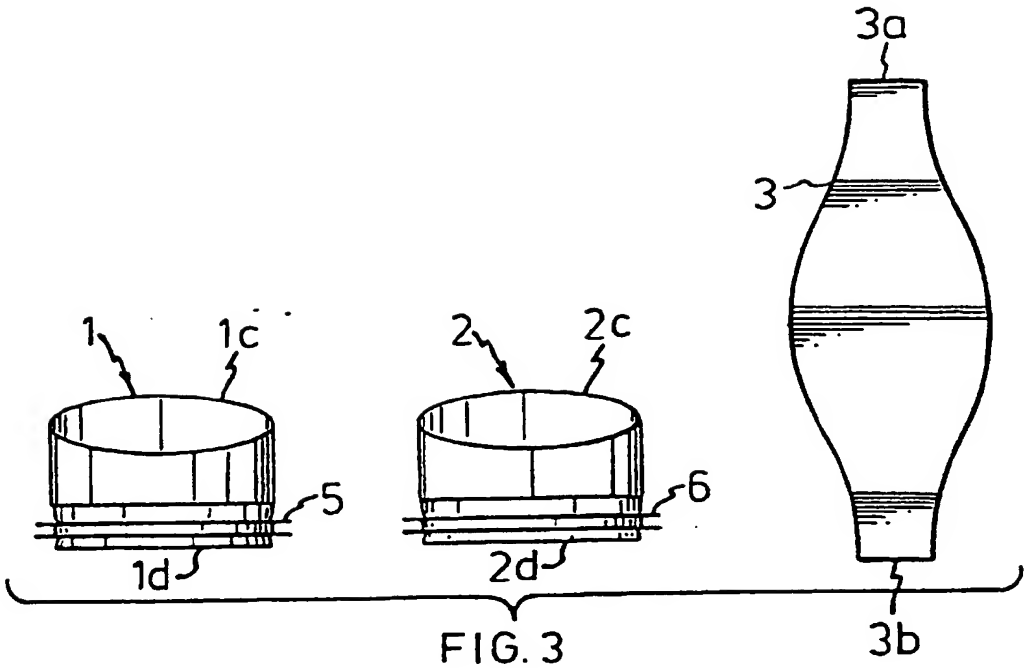
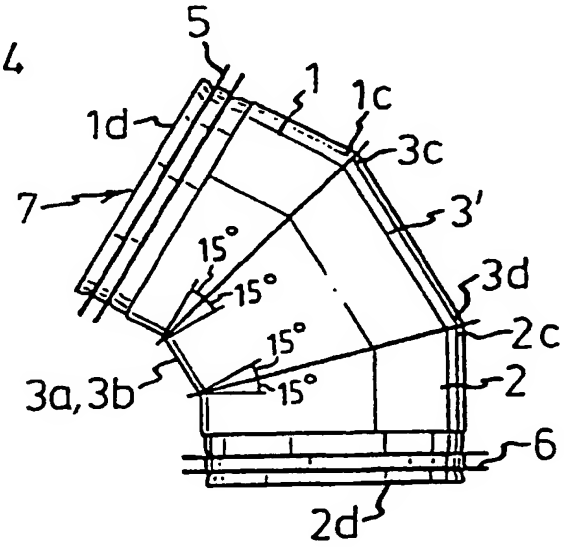


FIG. 3

FIG. 4



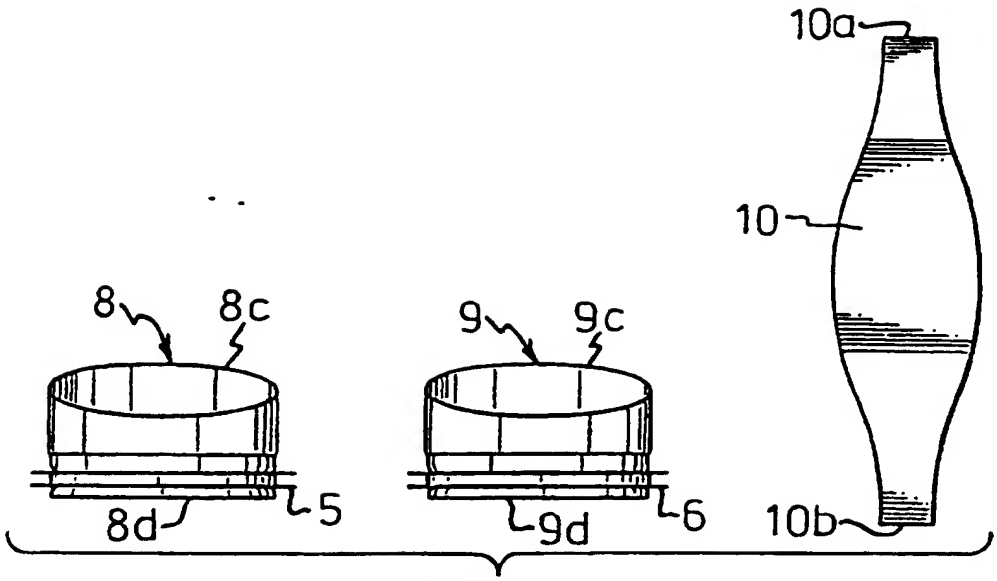
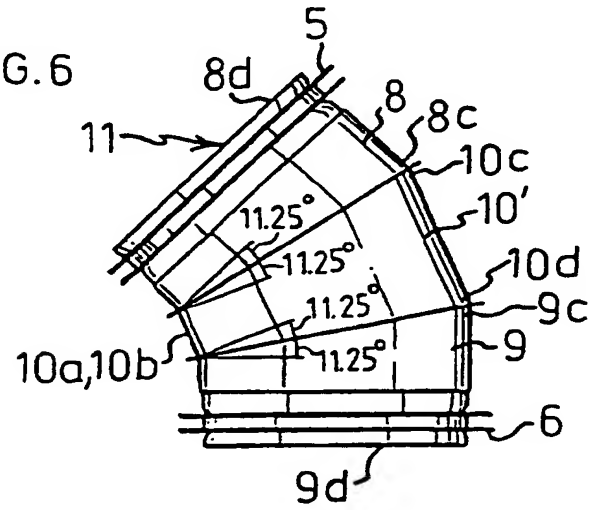


FIG. 5

FIG. 6



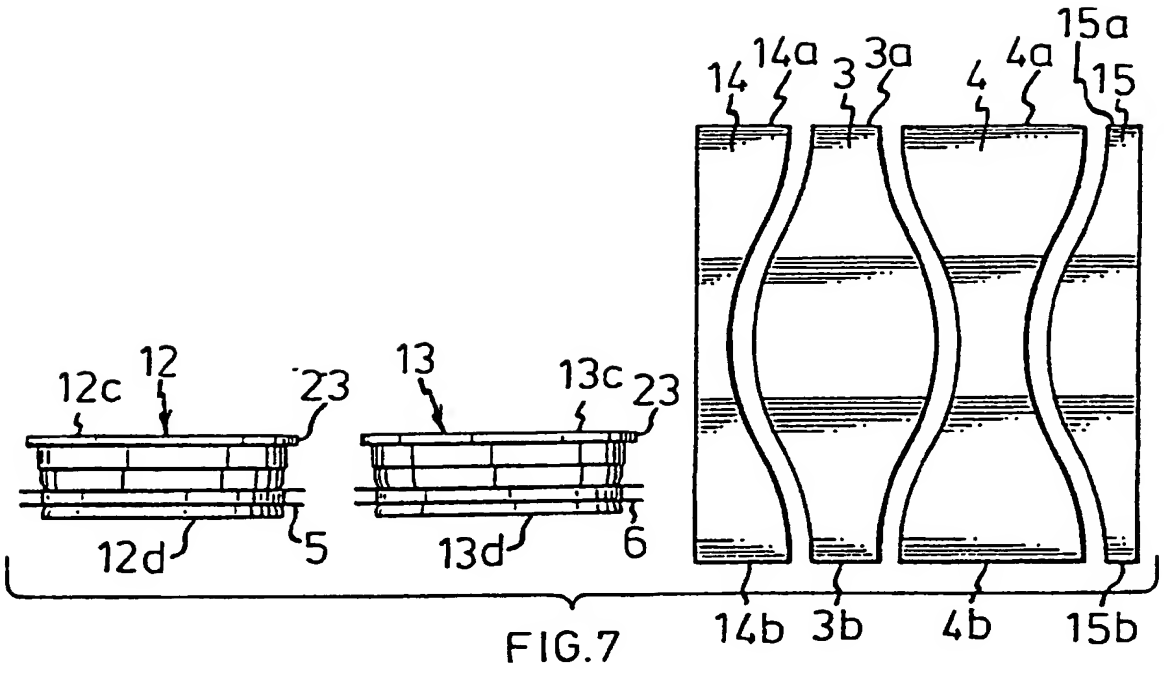
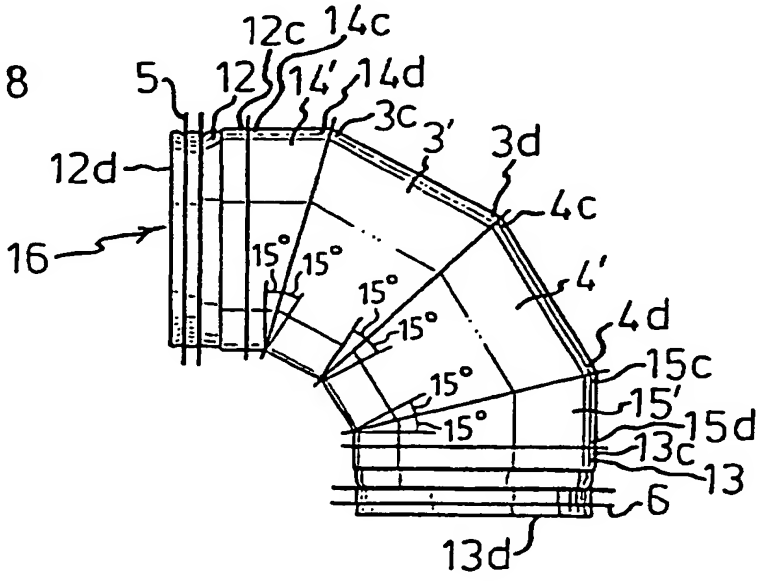


FIG.7

FIG.8



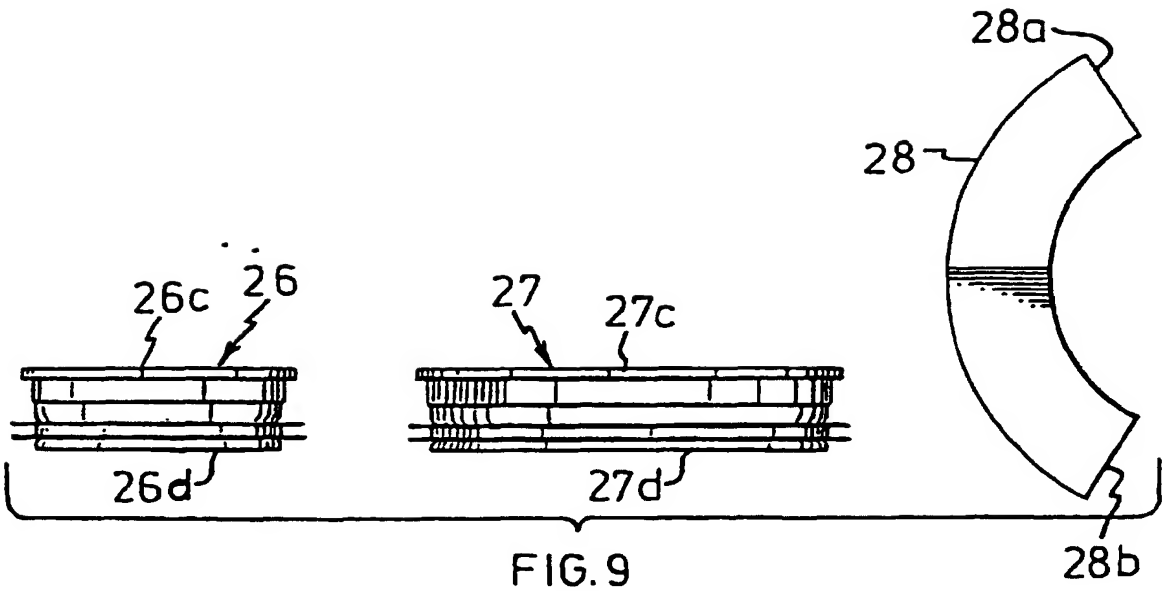
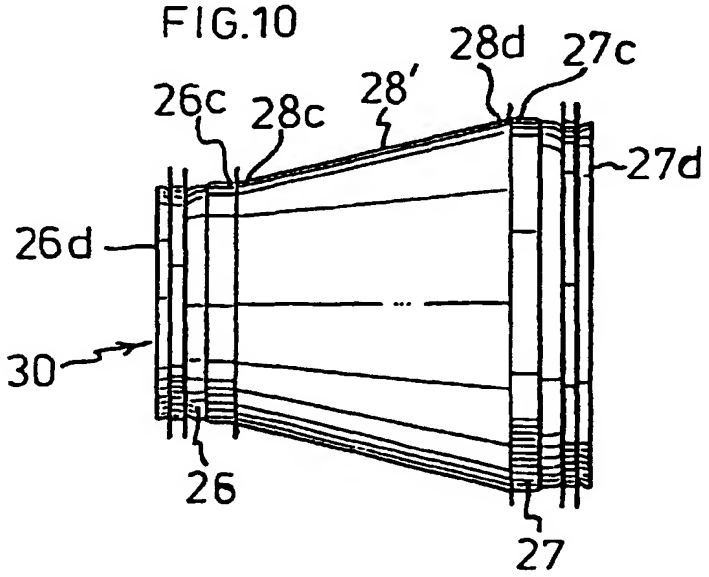


FIG.9

FIG.10



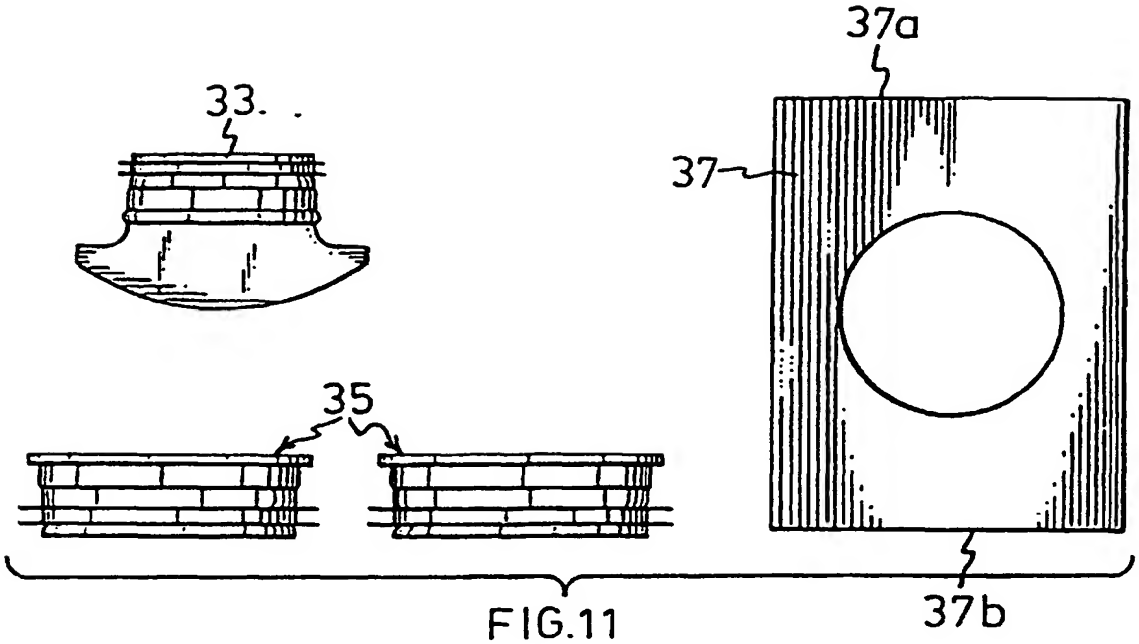


FIG.11

FIG.12

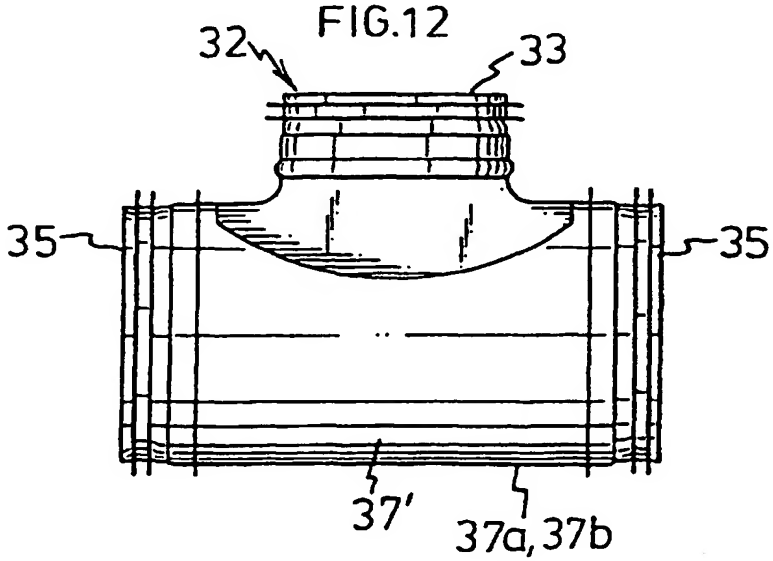


FIG.13

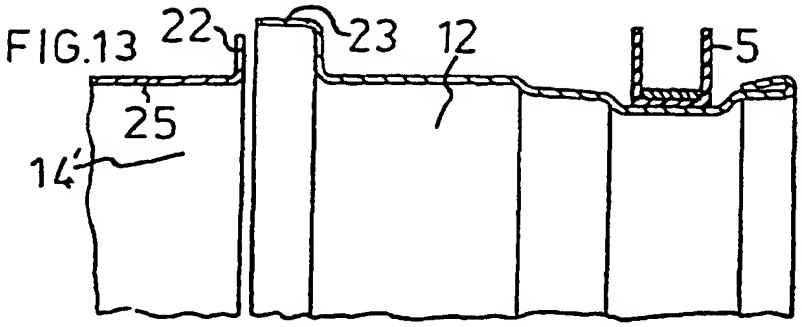


FIG.14

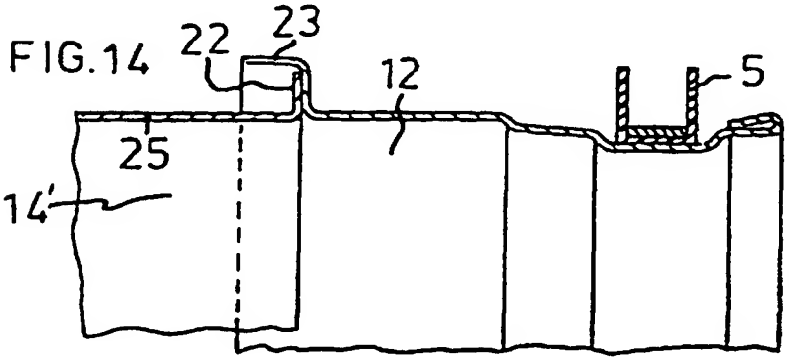


FIG.15

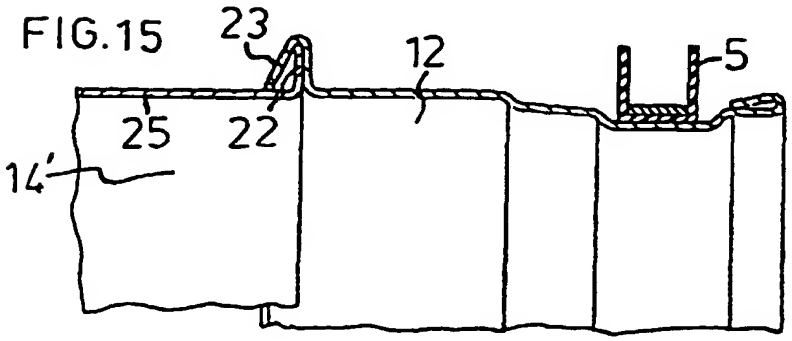


FIG.16

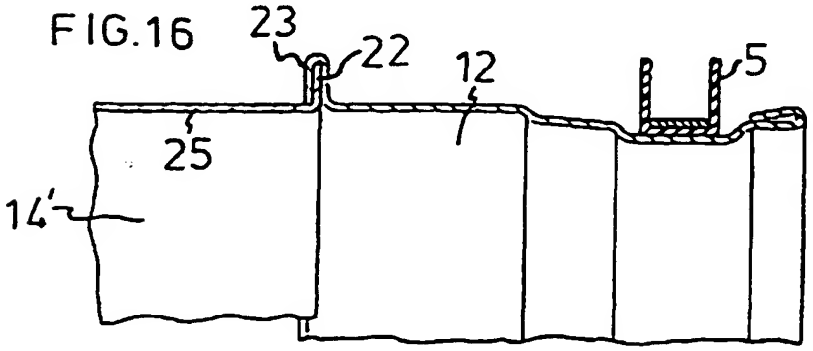


FIG.17

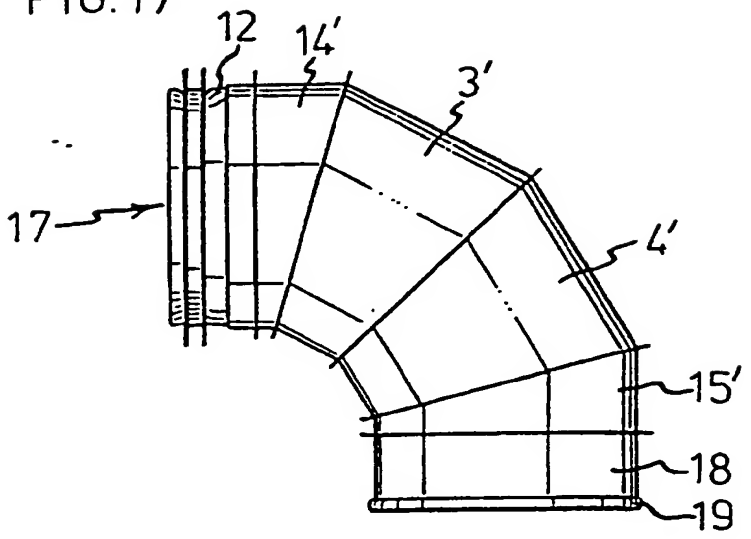
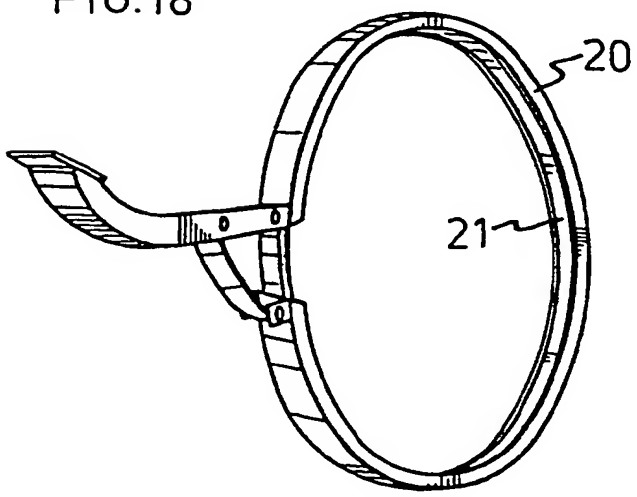


FIG.18



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 98 20 1769.1

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.6)
A	GB 2149040 A (FOSTER WHEELER ENERGY CORPORATION), 5 June 1985 (05.06.85) * figures 1-4 * --	1-12	F16L 43/00
A	US 997072 A (CHARLES MARES), 4 July 1911 (04.07.11) * figures 1-10 * --	1-12	
A	US 2392220 A (WILLIAM J. BRUHN ET AL), 1 January 1946 (01.01.46) * figures 1-11 * --	1-12	
A	SE 382675 B (LINDAB, LINDS INDUSTRI AB), 9 February 1976 (09.02.76) * figures 1-4 * --	4,5	TECHNICAL FIELDS SEARCHED (Int. Cl.6) B21C F16L
A	US 904199 A (BERNHARD W. HARRIS), 17 November 1908 (17.11.08) * figures 2-4 * -----	6-8	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
STOCKHOLM	31 August 1998	AXEL LINDHULT

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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